

Death Rate from Bronchopneumonia in Upstate New York, 1954-59

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THE DEATH rate from pneumonia in New York State, exclusive of New York City, has risen since 1954. The rise in 1957 and 1958 was not unexpected since influenza was pandemic then, but the continued climb prompted a study in 1959. A review of available vital statistics showed that the mortality from all forms of pneumonia was at a low point in 1954, and that the rise thereafter was mainly in the category of bronchopneumonia. The death rate from bronchopneumonia doubled between 1954 and 1959, going from 10.2 to 20.8 per 100,000 population (see table). The study was undertaken to determine if the rise was real, and, if so, what were the responsible factors and how reliable were the statistics. A further increase to 22.3 per 100,000 population was noted in 1961 and 21.9 in 1962.

The increase in the death rate from bronchopneumonia, category 491 in the sixth and seventh revisions of the International Statistical Classification of Diseases, was seen in all ages, but especially in those 65 years and over. Statistics for this category were not broken down by size of community. The death rate from all forms of pneumonia (I.S.C. 490-493) rose in metropolitan and nonmetropolitan areas, in communities with less than 10,000 population as well as in those with more than 10,000 population. The increase was somewhat greater in the larger communities. In Albany County, the death rate for all forms of pneumonia was 23.6 per 100,000 population in 1955 and 40.7 in 1959.

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Mortality from pneumonia of the newborn (I.S.C. 763) fluctuated, during 1949-61, between 0.4 and 0.7 per 1,000 live births.

Study Methods

The study was carried out in five hospitals in Albany County because most hospital beds there are in teaching institutions and their records should be above average. The inquiry was in two parts: one was a study of 20 percent of hospital deaths from all causes, and the other a study of all deaths in these hospitals in which bronchopneumonia was entered as an underlying or secondary cause, or associated condition.

The death certificate of every fifth patient who died in the county during 1955 and 1959 and the clinical records and autopsy protocols were examined and compared. Deaths under 1 month of age were excluded. This 20 percent sample consisted of 330 deaths in 1955 and 400 in 1959. Records were obtained for all but 14 deaths. The age group 70 or over formed 30 percent of the 1955 sample and 37 percent of the 1959 sample. The ratio of males to females was 2.2 to 1 in 1955 and 1.8 to 1 in 1959. Discharges from these institutions totaled 37,869 in 1955 and 44,343 in 1959.

Findings

According to the death certificates, bronchopneumonia was the underlying cause of five deaths in 1955 and nine in 1959. This was confirmed by clinical or autopsy records, or both, in only one case in 1955 and two in 1959. Clinical and autopsy records also disclosed that bronchopneumonia was the underlying cause of

death in one case in 1955 and one in 1959, which were ascribed to other causes on the death certificate.

Clinical or postmortem evidence of significant bronchopneumonia was noted in 75 (23 percent) of the 330 deaths in 1955 and in 88 (22 percent) of the 400 deaths in 1959. The rate was higher among patients on whom autopsy had been performed and older persons. The proportion of deaths in which an autopsy was performed fell from 55 percent in 1955 to 43 in 1959, but little difference was seen between the 2 years in the prevalence of bronchopneumonia by age or by sex in the patients on whom autopsy had been performed.

The occurrence of bronchopneumonia varied considerably by hospital. To some extent, this reflected the autopsy rate of the hospital. There were undoubtedly real differences in prevalence, if only because of the difference in the nature of the patients. One hospital had a large component of long-term patients suffering from senility, strokes, and the like.

In 1955, 19 patients with verified bronchopneumonia developed the disease before admission to the hospital, 50 after admission, and for 6, the development period was uncertain. In 1959, 25 persons developed the disease before admission, 50 after, and for 13 others the period was uncertain. This does not mean, necessarily, that the hospital is a dangerous place or

that bronchopneumonia in the community is increasing. Most of these patients had conditions predisposing to pneumonia, such as stroke, congestive heart failure, or far-advanced malignancies.

Predisposing Factors

The current interest in hospital infections has stressed the increasing vulnerability of the hospital population due, in part, to lowering of natural resistance by therapy with corticosteroids and antimetabolites and, in part, to prophylactic antibiotics, which often result in unsuccessfully treated infections. One-fourth of the patients who died of bronchopneumonia had received prophylactic antibiotics. Only a small part of the total received antimetabolites or corticosteroids. Most of the patients, approximately 60 percent, did not receive prophylactic antibiotics, corticosteroids, or antimetabolites. Venipuncture and other skin penetrations were common in all patients. An attempt to learn if bronchoscopy predisposes a patient to pneumonia failed because it often could not be determined whether bronchoscopy was performed because pneumonia had developed or bronchoscopy preceded the pneumonia. A few of the patients who died had diabetes mellitus, chronic alcoholism, or major surgery shortly preceding the onset of bronchopneumonia.

Deaths per 100,000 population from specified causes, New York State, exclusive of New York City, 1949-62

Year	Pneumonia, all forms (490-493)	Lobar pneumonia (490)	Bronchopneumonia (491)	Primary atypical pneumonia (492)	Pneumonia, other and unspecified (493)	Influenza (480-483)
1949	22.3	9.4	10.4	1.8	0.7	1.9
1950	21.0	8.2	10.4	2.0	.4	1.7
1951	21.3	7.3	10.7	2.7	.5	3.7
1952	21.1	7.8	10.6	2.1	.6	1.6
1953	20.0	6.9	10.7	1.9	.5	2.0
1954	18.9	6.5	10.2	1.6	.5	.8
1955	20.6	6.9	10.7	2.3	.7	.6
1956	21.6	7.5	10.9	2.5	.7	.5
1957	26.3	8.3	14.5	2.3	1.2	3.4
1958	26.8	5.2	18.0	2.3	1.3	.9
1959	29.9	5.6	20.8	2.3	1.2	.9
1960	29.6	5.9	20.1	2.2	1.4	1.4
1961	31.5	5.8	22.3	2.3	1.1	.5
1962	31.6	6.1	21.9	2.3	1.2	1.0

NOTE: Numbers in parentheses are from the sixth and seventh revisions of the International Statistical Classification of Diseases and Causes of Death.

In addition to the 20 percent sample, every death in a hospital in Albany County, 249 in 1955 and 312 in 1959, with bronchopneumonia entered anyplace on the certificate was studied for additional etiological data and accuracy of certification of cause of death. Hospital records were obtained for all but five deaths.

Etiological Agents

Few patients had adequate bacteriological study. With no information as to how the specimens were taken, we could not determine whether the reports on the cultures indicated contaminants or incitants of disease. The findings were mostly postmortem and sometimes, no doubt, represented cross-infecting or opportunistic agents rather than the original incitant which may have been eliminated by therapy. The majority of autopsies were made within 24 hours of death. If the bodies had been kept properly, as these were said to have been, postmortem invasion of the lung within this period is not considered a problem (1).

The etiology of fatal bronchopneumonia was mixed in both years. In 1955, results of culture of the lungs were recorded for 25 patients with bronchopneumonia on autopsy. Micro-organisms found in pure culture included coagulase-positive staphylococci in seven patients or 28 percent; coagulase-negative staphylococci, four; "coliforms," three, and other micro-organisms, two. Eight patients had mixed cultures, and one was negative.

In 1959, results of culture of the lungs were recorded for 66 patients with bronchopneumonia. Micro-organisms found in pure culture included coagulase-positive staphylococci in 13 patients, or 20 percent; "coliforms," 8; pneumococci, 4; and a variety of others, 10. Thirty patients had mixed cultures, and one was negative.

Inaccuracy of Death Certificates

Bronchopneumonia was listed as the underlying cause of death for 29 persons who died in Albany County hospitals in 1955 and 52 in 1959. The certification was inaccurate in 25 and 45 deaths, respectively. In 37 of the 70 incorrect certifications, pneumonia was the secondary cause. In 16 the patient was not medically at-

tended, and it would seem that the cause of death was not really known. In 10, pneumonia was not observed on autopsy, and in 5, pneumonia was not described in the hospital record or in the discharge diagnosis and there was no autopsy. In one certificate, autopsy disclosed lobar pneumonia; in another, unresolved pneumonia.

Discussion

The rise in mortality from pneumonia noted in upstate New York has also been noted elsewhere—in the United States, England, Wales, and Scotland, but not in Canada (2, 3, and personal communication from Dr. E. W. R. Best, Department of National Health and Welfare, Canada, July 1963). The reason for the rise is not clear. Air pollution is not a likely explanation for upstate New York since the rise occurred in rural as well as urban areas, and it is doubtful that air pollution has increased so sharply. Whether the rise is real is uncertain, but it probably is because it occurred simultaneously in different parts of the world. It is suspected, however, that its magnitude is exaggerated. Obviously, cause-of-death statistics are not a reliable gauge of trends when 70 of 81 deaths certified to bronchopneumonia were in error as charged. Cause-of-death certificates might be more credible if there were less pressure for a definite diagnosis of each death (4).

If pneumonia were more likely now than formerly to be caused by micro-organisms resistant to treatment, the case fatality and mortality rates should rise. This fact and the increasing age of the total population might partly account for a rise in mortality from bronchopneumonia. It is difficult, however, to reconcile the doubling of the rate in upstate New York in these 5 years with the fact that in the autopsy reports studied there was little or no rise in the disease. If bronchopneumonia as an underlying cause of death doubled, some reflection of this should be apparent in its increase as a terminal complication. The incidence was similar to that described by Kneeland and Price (5), who noted that in 1928–29 and in 1956–58 about 30 percent of the patients on whom autopsy was performed had pneumonia as a major or contributory cause of death.

The accurate diagnosis of the etiology of pneumonia is necessary to appraise the importance of the disease and the pathogen in order to institute or evaluate control measures. In the recent reports on "hospital staphylococci," pneumonia has been given as one of its severe manifestations. In this study, the diagnosis of staphylococcal pneumonia was often unsupported. One source of error is failure to take into account the fact that bacteria, including staphylococci, can be found in lungs free of pneumonia even though cultures are taken aseptically (1,5). Probably some cultures represent only contaminants. Cultures of material from the oral cavity, trachea, and bronchi may not reflect the etiology of the process in the lungs. To clarify the etiology and trend of bronchopneumonia and other pneumonias, it is desirable to improve the laboratory work, and, especially, to avoid misinterpretation of laboratory reports.

Summary and Conclusions

The death rate from bronchopneumonia in New York State, exclusive of New York City, rose from 10.2 per 100,000 population in 1954 to 20.8 in 1959 and 21.9 in 1962.

Investigation of a 20 percent sample of deaths from all causes in Albany County hospitals in 1955 and 1959 revealed that bronchopneumonia was the underlying cause of death in only 2 of 330 deaths in 1955 and 3 of 400 deaths in 1959.

No significant changes were noted in the prevalence or character of bronchopneumonia at death.

In addition to the 20 percent sample, every death in Albany County hospitals in 1955 and 1959 with bronchopneumonia entered anyplace on the death certificate was studied. Twenty-five of 29 deaths in 1955 and 45 of 52 deaths in 1959, certified to bronchopneumonia, were certified incorrectly.

The unreliability of cause-of-death statistics indicates a need for more accurate study and diagnosis of bronchopneumonia to determine the real trend and reasons.

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Professional Nurse Traineeship Program

More than 24,000 registered nurses have studied under the Public Health Service Professional Nurse Traineeship Program since its start in 1956, according to Surgeon General Luther L. Terry. Of these, 10,000 pursued full-time academic study at colleges and universities to prepare for teaching and administration; 14,000 took short-term intensive courses to improve and modernize their nursing skills.

"Short-term intensive courses are helping to bridge the gap between yesterday's training and today's needs," said Dr. Terry. He explained how: A course on cardiac nursing gave the nurse supervisors and teachers who attended it their first opportunity to work with the heart-lung machine and with

patients who had undergone open-heart surgery. Nurse teachers who attended a course on the scientific principles underlying all disease said they had an improved understanding of shock and stress and were able to focus more clearly on the ultimate objectives of medical care.

Descriptive listings of scheduled short-term courses and a list of colleges and universities offering full-time academic study under the Professional Nurse Traineeship Program are available on request from the Training Grants Branch, Division of Nursing, U.S. Public Health Service, Washington, D.C., 20201.